

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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P.O. BOX 2903
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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference 14917.0226WO01		Date of mailing (day/month/year) 03 MAR 2008
FOR FURTHER ACTION See paragraph 2 below		
International application No. PCT/US04/24026	International filing date (day/month/year) 26 July 2004 (26.07.2004)	Priority date (day/month/year) 31 December 2003 (31.12.2003)
International Patent Classification (IPC) or both national classification and IPC IPC: G06F 15/16 (2006.01) G06F 3/00 (2006.01),13/28(2006.01) USPC: 709/201,217;710/5,22		
Applicant MICROSOFT CORPORATION		

1. This opinion contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|--|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the opinion |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion 19 February 2008 (19.02.2008)	Authorized officer <i>Saleh Najjar</i> Saleh Najjar Telephone No. 571-272-7506
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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- ☐ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☒ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
See the lack of unity section of the International Search Report (Form PCT/ISA/210)

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-23 (Group 1)

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Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>NONE</u>	YES
	Claims <u>1-3, 5-16, 18, 20-23</u>	NO
Inventive step (IS)	Claims <u>4, 17, 19</u>	YES
	Claims <u>1-3, 5-16, 18, 20-23</u>	NO
Industrial applicability (IA)	Claims <u>1-23</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE
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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claim 1-3, 5-16, 18 and 20-23 lack novelty under PCT Article 33(2) as being anticipated by the International Publication No. WO 03/104943 A2 by Pandya, hereinafter Pandia.

Regarding claim 1, Pandya teaches a system for offloading an input/output (I/O) task from a first computer to a second computer, comprising: a client running on the first computer (p. 14:3-11 and Fig. 7 - client on the left); a server running on the second computer (p. 14:3-11 and Fig. 7 - server on the right); and at least one RDMA channel linking the first computer and the second computer (p. 9:12-15 and Fig. 35 - client/server RDMA transfer), wherein the first computer and the second computer communicate in accordance with a protocol comprising a network discovery phase (p. 17:32-33 and p. 18:1-22 - discovery) and an I/O processing phase (p. 9:26-29 and p. 10:1-4 - I/O processing).

Regarding claim 2, Pandya teaches the system of claim 1 wherein, in the I/O processing phase, read operations are implemented using RDMA (p. 47:28-32) and write operations are implemented using send operations (p. 20:9-14).

Regarding claim 3, Pandya teaches the system of claim 1 wherein the protocol is used in association with a second network protocol (pp. 3-4).

Regarding claim 5, Pandya teaches the system of claim 3 wherein the second protocol is CIFS (pp. 3-4).

Claim 6 lacks novelty in view of the lack of novelty of claim 1. Claim 6 is essentially the same as claim 4, except that it sets forth the invention as a computer program product rather than a system, as does claim 1.

Regarding claim 7, Pandya teaches a method for offloading an input/output (I/O) task from a first computer to a second computer, comprising: discovering, by a client on the first computer and a server on the second computer (pp. 17-18 - discovery), one or more shared RDMA-capable providers (p. 9:12-15 and Fig. 35 - client/server RDMA transfer); and posting, by the client, an I/O processing request for completion by the server on the second computer (p. 9:26-29 - I/O processing).

Regarding claim 8, Pandya teaches the method of claim 7 wherein the discovering one or more shared RDMA-capable providers further comprises:

obtaining, by the client, a server request resume key from the server (pp. 32-33);

opening, by the client, a pipe to the server (p. 35 - pipes); sending, by the client over the pipe, a negotiate request (p. 21); and sending, by the server over the pipe, a negotiate response including a minimal list of common providers (p. 21).

Regarding claim 9, Pandya teaches the method of claim 7, further comprising: creating, by the client, an RDMA connection to the server over a shared RDMA-capable provider (p. 21); and authenticating, by the client and the server, the RDMA connection (p. 27).

Regarding claim 10, Pandya teaches the method of claim 9, further comprising: registering, by the client, one or more files for use with the server over the RDMA connection (pp. 16-17).

Regarding claim 11, Pandya teaches the method of claim 10 wherein the registering one or more files comprises: sending, by the client to

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

the server, a register file message (pp. 16-17); and sending, by the server to the client, a register file completion message (pp. 16-17). Regarding claim 12, Pandya teaches the method of claim 9 wherein the authenticating the RDMA connection further comprises: sending, by the client, an authenticate request message to the server, the authenticate request message including a key ([0127]); if the key matches a previous key sent by the server to the client, sending, by the server, an authenticate response message to the client (pp. 40-41).

Regarding claim 13, Pandya teaches the method of claim 12 wherein the previous key is a key contained in a negotiate response message sent by the server to the client (pp. 40-41).

Regarding claim 14, Pandya teaches the method of claim 12, further comprising: sending, by the server to the client, a status response message to complete the authenticating (pp. 40-41).

Regarding claim 15, Pandya teaches the method of claim 7 wherein the posting the I/O processing request comprises sending, by the client, one of (a) a close request, (b) a cancel request, (c) a read request, (d) a 5 write request, (e) a vectored read request, and (f) a vectored write request (pp. 47-48).

Regarding claim 16, Pandya teaches the method of claim 15, further comprising: completing, by the server, the read request and the vectored read request by sending data using RDMA write operations ([0165]); and completing, by the server, the write request and the vectored write request by sending data using normal send operations (p. 51:9-14).

Regarding claim 18, Pandya teaches the method of claim 7 wherein posting the I/O processing request further includes indicating whether the completion by the server should be in polling mode (p. 27).

Regarding claim 20, Pandya teaches the method of claim 18, further comprising: if the client indicates that the completion should not be in polling mode, completing, by the server, the I/O processing request by sending a status block to the first computer by way of RDMA transfer (pp. 17-18).

Regarding claim 21, Pandya teaches the method of claim 18, further comprising: if the client indicates that the completion should be in polling mode, and the client has sent an interrupt request message to the server, sending, by the server to the client, an interrupt response message by way of an ordinary send (p. 26).

Regarding claim 22, Pandya teaches the method of claim 7 wherein posting the I/O processing request further includes specifying a number of credits in a header of the request (p. 35).

Regarding claim 23, Pandya teaches computer-readable media storing computer-executable instructions for implementing a method for offloading an input/output (I/O) task from a first computer to a second computer, the method comprising: discovering, by a client on the first computer and a server on the second computer (pp. 17-18 - discovery), one or more shared RDMA-capable providers; and posting, by the client, an I/O processing request for completion by the server on the second computer (p. 26 - storage offload).

Claims 4, 17 and 19 lack an inventive step under PCT Article 33(3) as being obvious over Pandya in view of the International Publication No. WO 02/46866 A2 by Grosner et al., hereinafter Grosner.

Regarding claim 4, Pandya teaches the system of claim 3.

Pandya does not explicitly teach such system wherein the second protocol is SMB.

Regarding claim 17, Pandya teaches the method of claim 15.

Pandya does not explicitly teach such system wherein the vectored write request includes a collapse flag in a header of the request.

However, Grosner, in analogous art, directed to digital information processing, and particularly to methods, systems and protocols for managing storage in digital networks, teaches a system, where a second protocol is SMB (pp. 10-11), and wherein the data flow is denoted via implementation of various flags (p. 60 - flags).

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to incorporate these teachings of Grosner into the teachings of Pandya in order to enhance the flexibility and compatibility of the system. Pandya, with incorporated teachings of Grosner, is hereinafter referred to as modified Pandya.

Modified Pandya teaches the missing limitations of claims 4 and 17, recited above.

Regarding claim 19, Pandya teaches the method of claim 18 wherein the indicating whether the completion should be in polling mode comprises indicating that the completion should not be in polling mode by setting an interrupt flag in a header of the I/O processing request (Grosner, page 60).

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NOTIFICATION OF TRANSMITTAL OF
 THE INTERNATIONAL SEARCH REPORT AND
 THE WRITTEN OPINION OF THE INTERNATIONAL
 SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 14917.0226WO01	Date of mailing (day/month/year)
International application No. PCT/US04/24026	International filing date (day/month/year) 26 July 2004 (26.07.2004)
Applicant MICROSOFT CORPORATION	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70.

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☒ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☒ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

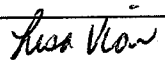
Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer  Saleh Najjar Telephone No. 571-272-7506
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